

IN THE DRAWINGS

Please replace the sheet of drawings containing Fig. 1 with the attached replacement sheet in which Fig. 1 is labeled as “Prior art.”

REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claim 20 has been amended responsive to the rejection under 35 U.S.C. § 112, which is believed to be moot.

The remaining claims have also been amended to clarify the invention. For example, Claim 13 has been amended to clarify that the glass sheet is continuously supported by the female former. The basis for this is found at lines 26-27 of page 16, and in the original recitation that the pressing step is continued when the vacuum is applied.

Claim 13 has also been amended to further recite that the male former is surrounded by a skirt. Basis for this believed to be evident from Figures 5A-5G. It has also been amended to further recite that the convex surface of the male former has means for applying a partial vacuum. Basis for this is found at page 19, lines 14-15. New Claim 23 corresponds to Claim 13 except that it recites that the convex surface is at least partly air permeable, rather than that it has means for applying a partial vacuum.

Claims 13, 17 and 19-22 were rejected under 35 U.S.C. § 102 as being anticipated by US patent 6,138,477 (Morin). Additionally, Claims 14-16 and 18 were rejected under 35 U.S.C. § 103 as being obvious over Morin. These rejections are respectfully traversed.

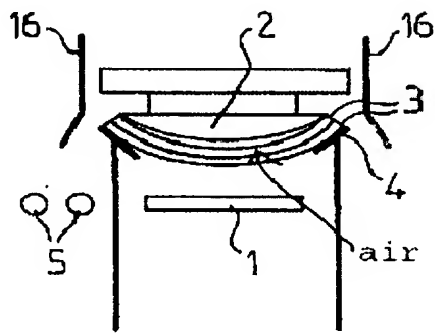
Morin corresponds to WO 95/01938 which is discussed on pages 3-4 of the present specification and is illustrated in prior art Fig. 1. As is there explained, Morin discloses a process and apparatus for forming bent glass sheets in which flat glass sheets transported by the former bed 1 are initially cushioned by air and then lifted by an annular counter-mold 4 toward the surface of a male mold 3 having a partial vacuum at its periphery. *The vacuum disengages the glass sheets from the annular counter-mold 4* (Morin, Figure 3; column 6, lines 55-57) and presses the glass sheets against the male mold 3. Thereafter, the annular counter-mold 4 rises further to press the edges of the sheets (Fig. 4; column 7, lines 1-12).

However, Morin has been found to be not entirely satisfactory for glass sheets having small radii of curvature, due to the disengagement of the glass sheets from the annular counter-mold 4 by the vacuum at the periphery of the male mold 3, i.e., the position of Figure 3 in Morin. When several stacked sheets are being bent, the sheets are not uniformly held by the vacuum and tend to separate (present specification, page 4, lines 10-29), leading to imprecise bending.

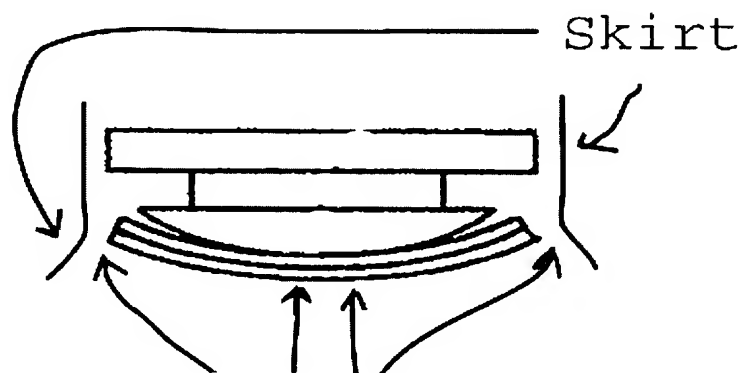
The invention overcomes this problem by sequential steps including (1) pressing the glass before applying a partial vacuum; (2) applying a vacuum through the surface of the upper mold; and (3) applying a vacuum through a surrounding skirt after discontinuing pressing, until the glass sheets can be transferred to a cooling support.

Unlike Morin, the glass sheets are first pressed between the male and female formers, and the vacuum is only thereafter applied at the male former (p. 16, lines 16-28). Therefore, the glass sheets are not separated from the annular counter-mold (female former) 4 by the vacuum, but instead are continuously supported thereby, which avoids the aforementioned problems of separation and imprecise positioning associated with the prior art.

The partial vacuum is first applied to the superposed glass sheets through the convex surface of the male former, which has means for applying a partial vacuum through the convex surface. This type of vacuum application, shown below in annotated Fig. 2C, is advantageous where the glass sheets have already been pressed between the male and female formers since this can result in trapped air pockets. It cannot be used for maintaining more than one sheet of glass in contact with the male former because the force of the vacuum is communicated only to the uppermost sheet in contact with the surface of the mould (upper position). The second sheet can fall but this is not problematic since the glass sheets are pressed between the male and female formers.



The pressing is then discontinued but the superposed glass sheets remain in contact with the male former under an effect of a partial vacuum at least partly applied through a skirt surrounding the male former, as shown below, until the glass sheets can be transferred to a cooling support. This type of aspiration is not suitable to evacuate air trapped between the upper glass sheet and the male former, but is effective for maintaining more than one sheet of glass in contact with the surface of the male mould, because the force of aspiration is communicated to the sheet in the lowest position.



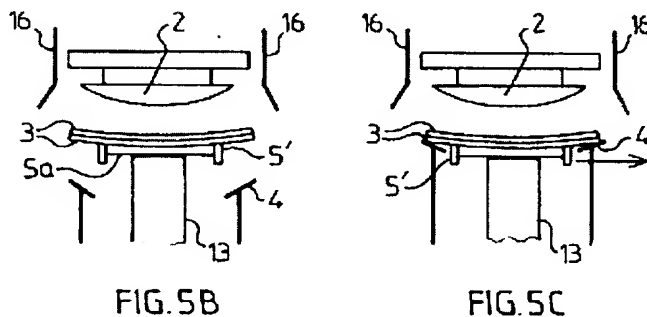
It may be appreciated that the claims clearly define over Morin. As already explained, the partial vacuum in Morin lifts the glass sheets from the annular counter-mold 4 (Figure 3), and so the application of the partial vacuum commences before the glass sheets have made contact with the male former 3. Additionally, there is no description of a partial vacuum being applied through the surface of the male former or through a surrounding skirt. Further, the pressing step of Figure 4 of Morin does not occur until after the partial vacuum has commenced, and so the pressing step does not “continue” at the commencement of the partial vacuum.

Moreover, these differences would not have been obvious in Morin. Applicants note the conclusion set forth in the sentence bridging pages 5-6 of the Office Action that because Morin teaches that a vacuum is applied at the periphery of the male mold, it would have been obvious to have provided a positive gas pressure at the center of the mold to aid in conforming to the shape of the male mold. Although this conclusion was drawn with reference to the rejection of Claim 15, it is also pertinent to the obviousness of amended Claim 13. Applicants respectfully submit that it is a *non sequitur* to conclude from the teaching in Morin of a vacuum applied at the periphery of the male mold that it would have been obvious to provide a pressure difference through the surface of the upper/male mold.

The purpose of the vacuum in Morin is to disengage the glass from the counter-mold 4 and apply it to the male mold 3 before pressing by the counter-mold. This object would not be furthered by applying a vacuum through the surface of the male mold since such a vacuum would only affect the upper glass sheet after pressing has begun. Moreover, while the vacuum applied through the surface of the male mold in the invention aids “in conforming to the shape of the male mold,” this benefit would have been *unexpected* in Morin, because there would be no trapped air in Morin since a vacuum is applied before contact of the glass with the male mold.

In any case, the combination of (1) pressing the glass before applying a partial vacuum; (2) applying the vacuum through the surface of the upper mold; and (3) applying a vacuum through a surrounding skirt after discontinuing pressing provides a synergy that would have been unobvious from Morin. Pressing the glass sheets before applying a partial vacuum maintains uniformity of the position of the sheets but can create trapped air pockets; the vacuum applied through the surface of the upper mold removes any such trapped air but cannot hold the lower glass sheets after pressing is discontinued; and the vacuum applied through a surrounding skirt holds the lower glass sheets after pressing is discontinued, until the glass sheets can be transferred to a cooling support. Thus this combination of features provides interconnected benefits. None of these interconnected benefits is predictable from the teaching in Morin of a vacuum for disengaging the glass from the counter-mold.

Concerning dependent Claim 20, this claim recites both the means for discharging the skeleton from the bending cell, and the means for moving vertically the annular female former. This is illustrated in Figs. 5B-5C below:



The skeleton is 5' and the annular female former is 4. This feature permit the former 4 to take over the sheets of glass and the skeleton 5' to be discharged.

Morin does not use a skeleton because the glass is only pre-bent by the annular former 4. Claim 20 defines over Morin for this reason as well.

Dependent Claim 15 further recites a positive gas pressure applied through the male former in a central region of the glass sheets, the male former being covered with a fibrous material. Claim 15 was rejected under 35 U.S.C. § 103 as being obvious over Morin in view of Canadian patent publication 2,058,729 (Reese), wherein Reese was cited to teach a woven matt at the surface of an upper mold.


Applicants again respectfully submit that it is a *non sequitur* to conclude from the teaching in Morin of a vacuum applied at the periphery of the male mold that it would have been obvious to provide a pressure difference through the surface of the upper mold therein. This is particularly true for the *positive* pressure recited in Claim 15.

Reese discloses a method of shaping glass sheets in which the upper mold has passages for applying a vacuum to the shaping surface, which is provided with a diffusing mat. However, although Reese teaches that it was known to provide an upper bending mold with passages for applying a vacuum to the shaping surface, it would not suggest the combination of (1) pressing the glass before applying a partial vacuum; (2) applying the vacuum through the surface of the upper mold; and (3) applying a vacuum through a surrounding skirt after discontinuing pressing.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,

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